Draft Technical Report
Item No: 0001AC

Title of the Project:

Optimization of Properties of a New Material for Electronic and Magnetic Applications

Topic No.:	BMDO 97-014
Contract No.:	BMDO N00014-97-C-0209
Contract Starting Date:	May 14, 1997
Contract Ending Date:	December 14,1997
Contractor:	SKION Corporation 50 Harrison Street Hoboken, NJ 07030

Prepared By:
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Report Date: October 14, 1997

Summary of activities for October 14, 1997 report:

1. Samples of MnAs/GaAs films have been prepared by molecular beam epitaxy with five different thicknesses, 200, 100, 50, 25 and 12.5 nm. The 200 nm film thickness was confirmed by optical microscopy and the 50 nm film was measured by on-edge high resolution scanning electron microscopy.

2. The crystal structures of all films were determined by x-ray diffraction. In earlier work, two structures were found, which I call type A and type B. The 100 nm film is mainly type A while the others are entirely or largely type B.

3. The magnetooptic Kerr effect has been used to measure the hysteresis curves of all samples. In some films a detailed study was made of the dependence of hysteresis behavior on direction of applied magnetic field. The films have large magnetizations and square hysteresis curves for the most part. Quite unexpectedly, the films have their magnetic easy and hard directions oriented the same way is in type A films, at ninety degrees to the type B directions found earlier. While the magnetizations are quite large, the coercive magnetic fields are larger than in the earlier films, i.e., these films are somewhat harder magnetically, which is advantageous for some applications.

4. Additional films will be grown soon that are much thinner since we are interested in the thinnest films that are still ferromagnetic.

5. We are now going to measure the effects of electric fields on the Kerr effect in the films.

The earlier films were grown using a source of As_2 while the present apparatus has a source of As_4. The growth kinetics are different, but we now can readily grow type B structures. We might also now be able to grow type A, which would be preferred since its structure is simpler.

In the next few weeks, we will very likely find out if increasing the electric field effects will work.

SKION Corporation

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VIA 2-Day Priority Mail

October 27, 1997

Dr. Colin Wood
Program Officer
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Ref.: Contract No. N00014-97-C-0209

Dear Dr. Wood:

Enclosed are the following:

1. Draft Technical Report 0001AC
2. SF 298
3. One original DD Form 250, Invoice #: SKI 0003
4. Four invoice copies

If you require additional information, please call me on (201) 963-5450 or fax (201) 963-5449, or e-mail fdurino@stevens-tech.edu.

Very truly yours,

Fran Durino

enclosures

cc: Bernd Tscherneff (letter w/SF-298)
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